Shrimp Trawl Bycatch Research in the US Gulf of Mexico and Southeastern Atlantic

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Abstract

A brief description is given of a project initiated in 1992 by the National Marine Fisheries Service, designed to assess the status of fish caught as bycatch in the shrimp fishery of southeastern Atlantic and Gulf of Mexico coast of the USA. Some preliminary results are presented.

Resumen

Se presenta una breve descripción de un proyecto de investigación iniciado en 1992 por el Servicio Nacional de Pesquerías Marinas y diseñado para evaluar el estado de los peces capturados como fauna acompañante de la pesquería de camarón del Atlántico suroriental y en aguas de USA en el Golfo de México. Se presentan algunos resultados preliminares.

Introduction

As elsewhere in the world, shrimp trawling in the US Gulf of Mexico and southeastern Atlantic has been identified as a contributing factor for the declining stocks of demersal finfishes (Alverson et al. 1994). A reduction in red snapper landings in the 1980s brought considerable attention to shrimp trawl bycatch as being the primary cause of juvenile red snapper mortality (see also Ehrhardt and Legault; Monroy-Garcia et al., this vol.). As a result of the 1990 amendments to the Magnuson Act, a three-year research plan was established to assess bycatch from the commercial shrimp fishery operating in the southeast region. Since April 1992, scientists at the Southeast Fisheries Science Center Galveston Laboratory of the National Marine Fisheries Service (NMFS) have been collecting bycatch data onboard shrimp vessels in the US Gulf of Mexico and southeastern Atlantic, in the context of a project that is briefly presented below, along with some preliminary results.

Goals and Objectives

The goals of this project were to update and expand bycatch estimates temporally and spatially in the offshore, nearshore and inshore waters of the Gulf of Mexico and the southeastern US Atlantic and to evaluate various devices to reduce shrimp trawl bycatch. Bycatch data were used to determine what species are impacted during shrimping activity. Catch-per-unit effort estimates for various species were available for inclusion into stock assessment models.

Materials and Methods

This research project follows the guidelines in the *Research Plan Addressing Finfish Bycatch in the Gulf of Mexico and South Atlantic Shrimp Fisheries*, prepared by the Gulf and South Atlantic Fishery Development Foundation under the direction of a Steering Committee composed of individuals representing industry, environmental, State and Federal interests in the United States. The intent of the sampling design is to survey the commercial shrimp fishery in operation and not to simply establish a research survey study of the bycatch or the finfish populations. The sampling universe in this case consists of all tows from all vessels shrimping in the Gulf of Mexico and along the Atlantic coast of the southeastern United States. Parameters of interest are the catch totals and size distributions of species of finfish and invertebrates incidentally taken by the shrimp fleet.

The quantity and type of bycatch change with fishing location, season and depth. Stratification by these variables will help to minimize the variances of catch estimates. Forty-five analysis strata were identified using season (January through April, May through August, and September through December), location (Statistical zones 1-9, 10-12, 13-17, 18-21, and the US Atlantic coast), and depth (inshore, nearshore and offshore). The statistical sample unit within each stratum consists of a single subsample from a trawl haul.

NMFS-trained observers collect the trawl haul subsamples and record the data following the established *NMFS Bycatch Characterization Protocol* published with the Bycatch Research Plan. A 13-kg per tow hour subsample is obtained from one randomly selected net after each tow. The data collected consist of total tow weight, subsample weight, species composition, abundance, weight and miscellaneous data from which life history information can be derived.

The actual number of sea days at the end of the project will greatly depend on cooperating shrimp vessels. Since the purpose of the research is to characterize total bycatch by the shrimp fleet, allocation of samples is based only on intensity of shrimping effort and not on abundance levels of selected finfish species.

Preliminary Results

A total of 750 sea days of observations on shrimp vessels has been conducted in the Gulf of Mexico and along the east coast of the United States between May 1992 and September 1993. However, only data through April 1993 for the Gulf of Mexico were available for summary analysis. All other data are in various stages of analysis.

As of late 1993, a total of 282 species of finfish, 72 species of crustaceans, and 47 species of invertebrates were identified from the 440 trawl samples (401 different species). Most of the species were taken only on rare occasion, with about sixteen species being found in more than 50% of the sampled trawls. Overall, Atlantic croaker *(Micropogonias undulatus)* and longspine porgy *(Stenotomus caprinus)* were the dominant bycatch species in terms of both biomass (38%) and numbers (37%). The other

eight biomass dominant bycatch were hardhead catfish *(Arius felis)*, Gulf menhaden *(Brevoortia patronus)*, inshore lizardfish *(Synodus foetens)*, Gulf butterfish *(Peprilus burti)*, spot (*Leiostomus xanthurus)*, sand seatrout *(Cynoscion arenarius)*, cutlass fish *(Trichiurus lepturus)* and lesser blue crab *(Callinectes similis)*, while the other eight numerical dominants included seabob shrimp *(Xiphopenaeus kroyeri)*, sugar shrimp *(Trachypenaeus* spp.*)*, longspine swimming crab *(Portunus spinicarpus)*, lesser blue crab, iridescent swimming crab *(Portunus gibbesii)*, mantis shrimp *(Squilla* spp.*)*, Gulf butterfish, and hardhead catfish. On a seasonal basis, Atlantic croaker and longspine porgy were the biomass and numerical dominants during the May 1992 through December 1992 period, while during the January 1993 through April 1993 period the biomass dominants were the inshore lizardfish and the longspine porgy, and the numerical dominants were the sugar shrimp and the Gulf butterfish. With regard to the Florida area, pinfish and inshore lizardfish were the biomass dominants, while sugar shrimp and mantis shrimp were the dominant bycatch by number. In the Mississippi/Alabama area, Atlantic croaker and sand seatrout were dominant by biomass, and Atlantic croaker and mantis shrimp were the numerical dominant bycatch. In the Louisiana and Texas areas, Atlantic croaker and longspine porgy were the biomass and numerical dominant bycatch. Red snapper *(Lutjanus campechanus)* accounted for less than 1% in terms of biomass for the entire Northern Gulf of Mexico coast. The highest percent biomass (2.7%) of red snapper occurred off the Texas coast in offshore waters during September 1992 through December 1992 (based on 25 trawl samples). Numerical abundance (number/hour) of red snapper ranged from zero off the Florida coast to 16 off the Texas coast from May 1992 though April 1993, while biomasses ($kg \cdot hour^{-1}$) ranged from zero to 0.5 $kg \cdot hour^{-1}$ for these same areas. Median length (FL) of red snapper for the same time period ranged from 7.5 cm to 17.4 cm.

Reference

Alverson, D.L., M.H. Freeberg, S.A. Murawski and J.G. Pope. 1994. A global assessment of fishery bycatch and discards. FAO Fish. Tech. Pap. 339, 233 p.